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Abstract Ten Linnaean names of *Pedicularis* (*Orobanchaceae*) are lectotypified: *P. comosa*, *P. flammea*, *P. hirsuta*, *P. incarnata*, *P. lapponica*, *P. resupinata*, *P. rostrata*, *P. tristis*, *P. tuberosa* and *P. verticillata*. Lectotypes are designated from the Linnaean herbarium at LINN. The type choices made here maintain the present usage of the corresponding Linnaean names for ten *Pedicularis* species.

Keywords Linnaean names; nomenclature; *Pedicularis*; typification

■ INTRODUCTION

Sixteen species names of *Pedicularis* were established by Carl Linnaeus, fourteen in *Species plantarum* (1753: 607–610) and two in *Mantissa plantarum* (1767: 86). Of these, seven names have designated lectotypes: *P. canadensis* L. (Pennell, 1935: 498), *P. sylvatica* L. (Jarvis & al., 1993: 74), *P. foliosa* L., *P. palustris* L., *P. recutita* L., *P. sceptrum-carolinum* L. and *P. verticillata* L. (all by Fischer, 1997: 113), while nine have remained untypified or, in the case of *P. verticillata*, the typification is problematic (see below). Lectotypes are here designated for the remaining nine names for which none currently exists (*P. comosa* L., *P. flammea* L., *P. hirsuta* L., *P. incarnata* L., *P. lapponica* L., *P. resupinata* L., *P. rostrata* L., *P. tristis* L., *P. tuberosa* L.) and the problematic typification of *P. verticillata* is rectified by a more explicit lectotypification.

■ TYPIFICATION OF THE NAMES

Pedicularis comosa L., Sp. Pl.: 609. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.31 (LINN!) [image available at http://linnean-online.org/6778/].

Linnaeus (1753: 609) provided a new diagnosis ("PEDICULARIS caule simplici, spica foliosa, corollis galea acutis emarginatis, calycibus quinquedentatis"), along with synonyms from Haller (1742: 623, no. 8, t. 17, fig. 2 [misprinted as fig. 3]; "Pedicularis foliis alternis: pinnis pinnatis, foliis ex spica florigera longe eminentibus") and Bauhin (1623: 163, no. II; "Pedicularis alpina, filicis folio, major"), the statement "*Habitat in Alpibus* Helveticis", and a detailed description of the calyx and corolla ("Calyx *5dentatus, tubulosus, integerrimus, parum pilosus*. Corolla *labio superiore acuto, sed emarginato: dentibus duobus, acutis, nutantibus*."). The diagnosis as well as the description of calyx and corolla were retained in the second and third edition of *Species plantarum* (Linnaeus, 1763: 847; 1764: 847) but not the synonyms and the information about its distribution. Both synonyms stated in the first edition, in fact, refer to *P. foliosa* L. which Linnaeus described somewhat later (Linnaeus, 1767: 86) and where, among others, the synonyms by Haller (1742: 623) and Bauhin (1623: 163) reappear. In the second and third edition, he added a synonym for *P. comosa* from Allioni (1755: 51, t. 11, fig. 2; "Pedicularis foliis alternis: pinnis semipinnatis, floribus rostratis ochroleucis dense spicatis") along with a corrected distribution "*Habitat in Alpibus* Italicis". However, Linnaeus's citation herein is incorrect, because the plant represented by the illustration "t. 11, fig. 2" has beaked flowers that are referable to *P. incarnata* (Allioni 1785: 63). In the subsequent treatment, Allioni (1785: 65) and Willdenow (1800: 220) revised the synonymy from Allioni (1755: 50, t. 11, fig. 1; "Pedicularis foliis bipinnatis, calyce non cristato, floribus ochroleucis in spicam nudam congestis.").

There are two specimens conserved in the Linnaean herbarium at LINN. The sheet no. 763.30 (LINN), from Traugott Gerber, was annotated as "*1 comosa*" by Linnaeus, indicating that this specimen should have been studied by Linnaeus, however, the annotated number ("1") differs from the *Species plantarum* number of this species ("13"). Actually, the specimen on sheet no. 763.30 represents what is now known as *P. kaufmannii* Pinzger, which was long referred to as *P. comosa*, especially by Russian authors (see Shishkin & Bobrov, 1955: 848). The other sheet, no. 763.31 (LINN), was annotated as "Allion. t.11 f.1" by Linnaeus, referring to *Rariorum Pedemontii stirpium* by Allioni (1755: 50; see above). This somewhat poor specimen may be a later addition to the herbarium, but it

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should be studied by Linnaeus, and corresponds to the current species concept of *P. comosa* from the SW, C and S European Mountains (e.g., Meyer, 1972; Aeschimann & al., 2004). The specimen is difficult to exclude as original material, although it was not annotated as "*13 comosa*" by Linnaeus. In addition, no original material could be traced in the Burser herbarium (UPS) and the Clifford herbarium (BM). In order to retain the name *P. comosa* in its current usage, therefore, the sheet no. 763.31 (LINN) is the only available material that can be selected as the lectotype. The Linnaean herbarium at Stockholm (S-LINN) hosts a sheet numbered 253.3 which was transferred from the herbarium of Montin. Montin annotated the well-preserved specimen "*Pedicularis comosa Linn … Habitat in Siberia …*" This specimen also represents *P. kaufmannii*.

Pedicularis flammea L., Sp. Pl.: 609. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.21 (LINN!) [image available at: http://linnean-online.org/6768/].

Linnaeus (1753: 609) provided a new diagnosis ("PEDICULARIS caule simplici, foliis pinnatis retro-imbricatis"), along with synonyms from his own *Flora lapponica* (1737a: 202, no. 244) and *Flora suecica* (1745: 184, no. 509), i.e., "Pedicularis caule simplici, foliis semipinnatis obtusis: laciniis imbricatis crenatis". There are additional synonyms from Haller (1742: 622, no. 6; "Pedicularis caule erecto non ramoso, pinnis foliorum retroversis imbricatis") and Bauhin (1623: 163, no. IV; "Pedicularis alpina, folio ceterach") as well as the statement "*Habitat in Alpibus* Lapponiae, Helvetiae". In *Flora lapponica*, an illustration referring to *P. flammea* was depicted on fig. 2 of tab. IV, not tab. II as presented in the protologue.

It is important to mention that *P. flammea* has a very close ally, *P. oederi* Vahl, which Vahl (1806: 580) separated from *P. flammea* based on material from Scandinavia. He already indicated non-overlapping distribution of the two species: *P. flammea* occurring in northern Scandinavia, i.e. Lapland, and *P. oederi* occurring in the mountains of south-central Scandinavia. In this context, the synonyms by Haller and Bauhin mentioned in the Linnaean protologue (see above) actually refer to *P. oederi* in Switzerland (= Helvetiae).

There is an original specimen in the Linnaean herbarium (sheet no. 763.21, LINN) annotated "*9 flammea*" by Linnaeus. The number corresponds with the *Species plantarum* number of this species ("9"). The well-conserved flowering plant of the sheet no. 763.21 corresponds with the current concept of *P. flammea*, and this sheet is designated as the lectotype.

Pedicularis hirsuta L., Sp. Pl.: 609. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.22 (LINN!) [image available at: http://linnean-online.org/6769/].

Linnaeus (1753: 609) provided a new diagnosis ("PEDICULARIS caule simplici, foliis dentato-pinnatis linearibus, calycibus hirsutis"), along with one synonym from his own *Flora lapponica* (1737a: 203, no. 245) and *Flora suecica* (1745: 184, no. 508), i.e., "Pedicularis caule simplici, calycibus villosis, foliis linearibus dentatis crenatis", and the statement "*Habitat in* Lapponiae *Alpibus*". There are two specimens conserved at the Linnaean herbarium. The sheet no. 763.22 (LINN) is annotated "*10 hirsuta*" and "*Lapp.*" by Linnaeus. The number corresponds with the *Species plantarum* number of this species ("10"), and "Lapp" refers to the geographic origin "Lapponia". This specimen contains one well-conserved flowering plant. Another sheet (no. 763.23, LINN) is also annotated "10" by Linnaeus, and it includes three plants, two in flower and one in fruit. Herein, we favour choosing the first sheet as the lectotype of *P. hirsuta*, because this specimen was collected from Lapponia, and floral characters alone were enough to identify this species.

Pedicularis incarnata L., Sp. Pl.: 609. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.18 (LINN!) [image available at: http://linnean-online.org/6765/].

Linnaeus (1753: 609) provided a diagnosis ("PEDICULARIS caule simplici, foliis pinnatis serratis, calycibus rotundatis glabris, corollis galea uncinatis acutis"), along with the statement "*Habitat in* Sibiria", and a detailed description. There are two specimens conserved at the Linnaean herbarium. The sheet no. 763.18 (LINN), from Johann Georg Gmelin, is annotated "*11 incarnata*" by Linnaeus. The number corresponds with the *Species plantarum* number of this species ("11"), indicating it is the original material for *P. incarnata*.

Another sheet (no. 763.19, LINN), from Nicolaus Joseph Jacquin, is annotated "*No. 94 Pedicularis incarnata*" by Jacquin. This specimen is a later addition to the herbarium and not original material for the name. In fact, Jacquin's red-flowered specimen belongs to a later homonym "*P. incarnata* Jacq.", which is known nowadays as *P. rostratospicata* Crantz, as well as a specimen in the Burser herbarium (VIII: 88, BOT: V-173617, UPS) collected from Austria. Crantz (1769: 317–320) assumed that Linnaean concept of *P. rostrata* (see below) included the European Alpine "*P. incarnata* Jacq." In order to establish an informative name that retains the taxonomic history, he then chose *P. rostratospicata* (as "*rostrato-spicata*", see also Stadlmann 1906). The original description by Linnaeus (1753: 609) matches the specimen on sheet no. 763.18, apart from the corolla colour "*incarnata*" = "flesh-coloured". Therefore, this sheet is selected as the lectotype of *P. incarnata*.

Pedicularis lapponica L., Sp. Pl.: 609. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.10 (LINN!) [image available at: http://linnean-online.org/6757/].

Linnaeus (1753: 609) provided a new diagnosis ("PEDICULARIS caule simplici, foliis pinnatifidis serratis, calycibus bifidis obtusis"), along with a synonym, and the statement "*Habitat in Alpibus* Lapponicis *frequens*". The synonym "Pedicularis caule simplici, foliis lanceolatis semipinnatis serratis acutis, *Fl. lapp. 242. t. 4. f. 1. Fl. suec. 507. Hort. cliff. 326. Roy. lugdb. 299*" refers to *Flora lapponica* (1737a: 197), *Flora suecica* (1745: 184), *Hortus cliffortianus* (1737b: 326), and Royen's *Florae leydensis prodromus* (1740: 299). There is a specimen in the Linnaean herbarium (no. 763.10, LINN) annotated "*12 lapponica*" by Linnaeus. The number corresponds with the *Species plantarum* number of this species ("12"), indicating it is the original material for *P. lapponica*. In the Clifford herbarium (BM), the sheet M000646243 links

with *P. lapponica*, while this collection has one inflorescence with fragmentary leaves. The sheet no. 763.10 is complete and well conserved including three plants in flower and three plants in fruit. All six plants correspond with the current concept of *P. lapponica*. Therefore, this sheet is selected as the lectotype of *P. lapponica*.

Pedicularis resupinata L., Sp. Pl.: 608. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.7 (LINN!) [image available at: http://linnean-online.org/6754/].

Linnaeus (1753: 608) provided a diagnosis ("PEDICULARIS caule simplici, foliis lanceolatis serratis crenulatis, floribus resupinatis"), along with the statement "*Habitat in* Sibiria" and the collectors "*D. Gmelin, D. Demidoff* " in addition to a detailed description. Two original specimens are conserved at the Linnaean herbarium. The sheet no. 763.7 (LINN) including one specimen in flower is annotated "*6 resupinata*" and "*Pedicularis videtur cum calyce inverso*" (on the verso) by Linnaeus. The number corresponds with the *Species plantarum* number of this species ("6"). Another sheet (no. 763.8, LINN) came from Pehr Kalm. Smith wrote "*in HB sp. nova? JES*" at the lower-left corner, and Linnaeus annotated "*Pedicularis caule simplici, fol. lanceolatis crenatis: crenis serratis*" on the verso, which is close to the Linnaean diagnosis on vegetative characters. This specimen comprises of two plants, one inflorescence with damaged flowers and fragmentary leaves and one initial flowering plant with several-branched young inflorescences. Herein, we favour choosing the first sheet as the lectotype of *P. resupinata*, because the well-conserved specimen with resupinate calyxes and corollas corresponds to the species epithet.

Pedicularis rostrata L., Sp. Pl.: 607. 1753 – **Lectotype (designated here):** [illustration in] Haller, Enum. Stirp. Helv.: t. 16, fig. 1. 1742.

Linnaeus (1753: 607) provided a new diagnosis ("PEDICULARIS caule subramoso, corollis galea rostrato-acuminatis, calycibus subhirsutis"), along with synonyms from Haller (1742: 621, no. 2, t. 16, fig. 1; "Pedicularis alpina, foliis alternis: pinnulis incisis, floribus sparsis rostratis purpureis"), Bauhin (1623: 163, no. II; "Pedicularis alpina, filicis folio, minor"), and Clusius (1601: ccx; "Alectorolophus alpina 3 minor"), and the statement "*Habitat in Alpibus* Helvetiae, Austriae".

The name *P. rostrata* is associated with lengthy debates about which taxonomic entity Linnaeus referred to since the protologue and synonyms given are ambiguous (e.g., Koch, 1833; Steininger, 1887; Stadlmann, 1906). Linnaeus's description equally well fits what is now known as *P. kerneri* Dalla Torre (synonyms: *P. rostrata* Koch, *P. rostrata* var. *caespitosa* Rchb., *P. caespitosa* Sieb., *P. rhaetica* Steininger) growing on siliceous substrate from the Central Austrian Alps westwards to the Spanish Pyrenees, and *P. rostratocapitata* Crantz (synonyms: *P. jacquini* Koch ≡ *P. rostrata* Jacq.) occurring on calcareous substrate from the Eastern Swiss Alps eastwards to the Carpathian and Dinaric Mts. Haller's synonym (see above) and habitat description ("*Gotthardi M.*" = siliceous Gotthard Massif in the Central Swiss Alps) refer to the current concept of *P. kerneri*. However, Haller's illustration (1742: t. 16, fig. 1) depicts an unusually large ascending individual of *P. kerneri* with a long-pedicelled axillary flower and a terminal subcapitate inflorescence (e.g., Hegi, 1965). Clusius's synonym refers to *P. rostratocapitata* as deduced from the habitat description. In the second edition of *Species plantarum*, Linnaeus (1763: 845) provided an additional synonym from Kramer (1756: 183, no. 3; "Pedicularis caule subramoso, corollis galea rostrato-acuminatis, calycibus subhirsutis") which is, in fact, Linnaeus's own diagnosis from the first edition as used by Kramer. Stadlmann (1906) concludes in his text that according to the International Code of Botanical Nomenclature (Vienna Rules; Briquet, 1906) the name *P. rostrata* should be rejected because of Art. 51, lit. 4, which reads "When the group which it designates embraces elements altogether incoherent, or when it becomes a permanent source of confusion or error". However, this requirement is not included in the *Melbourne Code* (McNeill & al., 2012).

There are two specimens in the Linnaean herbarium. The sheet no. 763.25 (LINN), from Giovanni Scopoli, is annotated "*rostrata*" by Linnaeus and "*Pedicularis vol. 3. pag. 125 no. n*" by the Austrian Johann Anton Scopoli, whereas this specimen may be not original material, because it lacks the *Species plantarum* number of this species ("3"). This sheet with two individuals corresponds to the current delimitation of *P. rostratocapitata*. Another sheet (no. 763.26, LINN) came from the Italian Carlo Allioni annotated "*Pedicularis alpina, Asphodeli radice, purpurascente flore Insa*" by Allioni. This is a synonym taken from Tournefort's (1700: 173) *Institutiones rei herbariae* and the last word of the annotation, i.e., "*Insa*" may be an erroneous deciphering of the abbreviation "Inst." Smith further annotated the sheet "*vide P. fasciculatam Willd. n.30*" referring to *Species plantarum* edited by Willdenow (1800: 218). Apparently Smith was in doubt whether the specimen belongs to what is now known as *P. gyroflexa* Villars (despite some remaining unresolved synonymy, e.g., Willdenow, 1800; Candolle, 1846; Hegi, 1965). The latter specimen is a later addition to the herbarium and cannot be unambiguously identified based on the photography only.

Neither specimen in the Linnaean herbarium is original material, and no original material could be traced in the Burser herbarium (UPS) and the Clifford herbarium (BM). The illustration in Haller (1742: t. 16, fig. 1) seems to be the only existing original material and thus it is chosen here as the lectotype of *P. rostrata*.

Pedicularis tristis L., Sp. Pl.: 608. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.9 (LINN!) [image available at: http://linnean-online.org/6756/].

Linnaeus (1753: 608) provided a new diagnosis ("PEDICULARIS caule simplici, corollarum galeis margine villosis"), citing a diagnosis "Pedicularis caule simplici, foliis semipinnatis; pinnulis obtusis acute serratis" written by Gmelin, and the statement "*Habitat in* Sibiria". There is an original specimen in the Linnaean herbarium (no. 763.9, LINN) annotated "*8 tristis*" and "*Pedicularis caule simplici, foliis semipinnatis pinnulis obtusis acute serratis. Gmel*" (on the verso) by Linnaeus. The

number corresponds with the *Species plantarum* number of this species ("8"), and the writing on the reverse corresponds to Gmelin's diagnosis in the protologue. The sheet no. 763.9 is complete and well conserved, and it is designated as the lectotype of *P. tristis*.

Pedicularis tuberosa L., Sp. Pl.: 610. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.27 (LINN!) [image available at: http://linnean-online.org/6774/].

Linnaeus (1753: 610) provided a new diagnosis ("PEDICULARIS caule simplici, calycibus crenatis, corollis galea rostrato aduncis"), adding synonyms from Haller (1742: 620, no. 1) and Sauvages de la Croix (1751: 247, no. 22), and also from Bauhin (1623: 163, n. IX), Boccone (1697: 315, t. 8) and Barrelier (1714: 22, no. 210, t. 118, fig. 469), and the statement "*Habitat in Alpibus* Helveticis, Italicis". In order to choose the right lectotype and preserve the Linnaean name, the close allies of calcifuge *P. tuberosa* need to be taken into account as well, i.e., the three calcicole species *P. ascendens* Schleich. ex Gaudin (synonym: *P. barrelieri* Rchb.), *P. elongata* Kern., and *P. julica* E. Mayer.

There are three specimens in the Linnaean herbarium. The first (no. 763.27, LINN) came from Giovanni Antonio Scopoli and is annotated "*14 tuberosa*" by Linnaeus and "*Pedicularis alpina lutea C.B. Tom. 3 p.126 no. 4*" by Scopoli. The second specimen (no. 763.28, LINN) is annotated "*14* [illegible inscription at base of sheet]" by Linnaeus. The bract and calyx features indicate these two specimens to belong to *P. tuberosa* as we understand it today (e.g., Aeschimann & al., 2004). The third specimen (no. 763.29, LINN) came from Domingos Vandelli and was annotated "*W. 13 tuberosa*" by Linnaeus and "*Vand. Linn. Corr. list 1763 no. 13 det. L.*" by Savage. This specimen is a later addition to the herbarium, and it very likely belongs to *P. ascendens*. For the first two original specimens, the sheet no. 763.27 shows well-preserved leaves and flowers, while the sheet no. 763.28 has damaged leaves and flowers. Therefore, we select the sheet no. 763.27 as the lectotype of *P. tuberosa*.

Pedicularis verticillata L., Sp. Pl.: 608. 1753 – **Lectotype (designated here):** Herb. Linn. No. 763.20, the left plant (LINN!) [image available at: http://linnean-online.org/6767/].

Linnaeus coined a new diagnosis ("PEDICULARIS caule simplici, foliis quaternis"), along with three synonyms, and the statement "*Habitat in* Sibiria, Helvetia, Austria". Two specimens are original material for the name. The first is material (VIII: 89, BOT: V-173618, UPS) in the Burser Herbarium. The second is in the Linnaean herbarium (no. 763.20, LINN), which was designated as the lectotype by Fischer (1997). However, the latter sheet contains two plants belonging to *P. verticillata* (left plant) and *P. chamissonis* Steven (right plant). Both species have verticillate leaves, but differ in that *P. verticillata* has a beakless galea and *P. chamissonis* has a beaked galea. The Linnaean diagnosis lacks this corolla character, however, the illustration in Haller (1742: t. 17, fig. 1) clearly shows the beakless flower of *P. verticillata*. Therefore, the left plant is chosen as the lectotype of *P. verticillata*. We note in passing that Fischer (1997) stated that an illustration in Clusius (1601: ccx) represents *P. verticillata*, while the plants depicted are alternate-leaved.

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